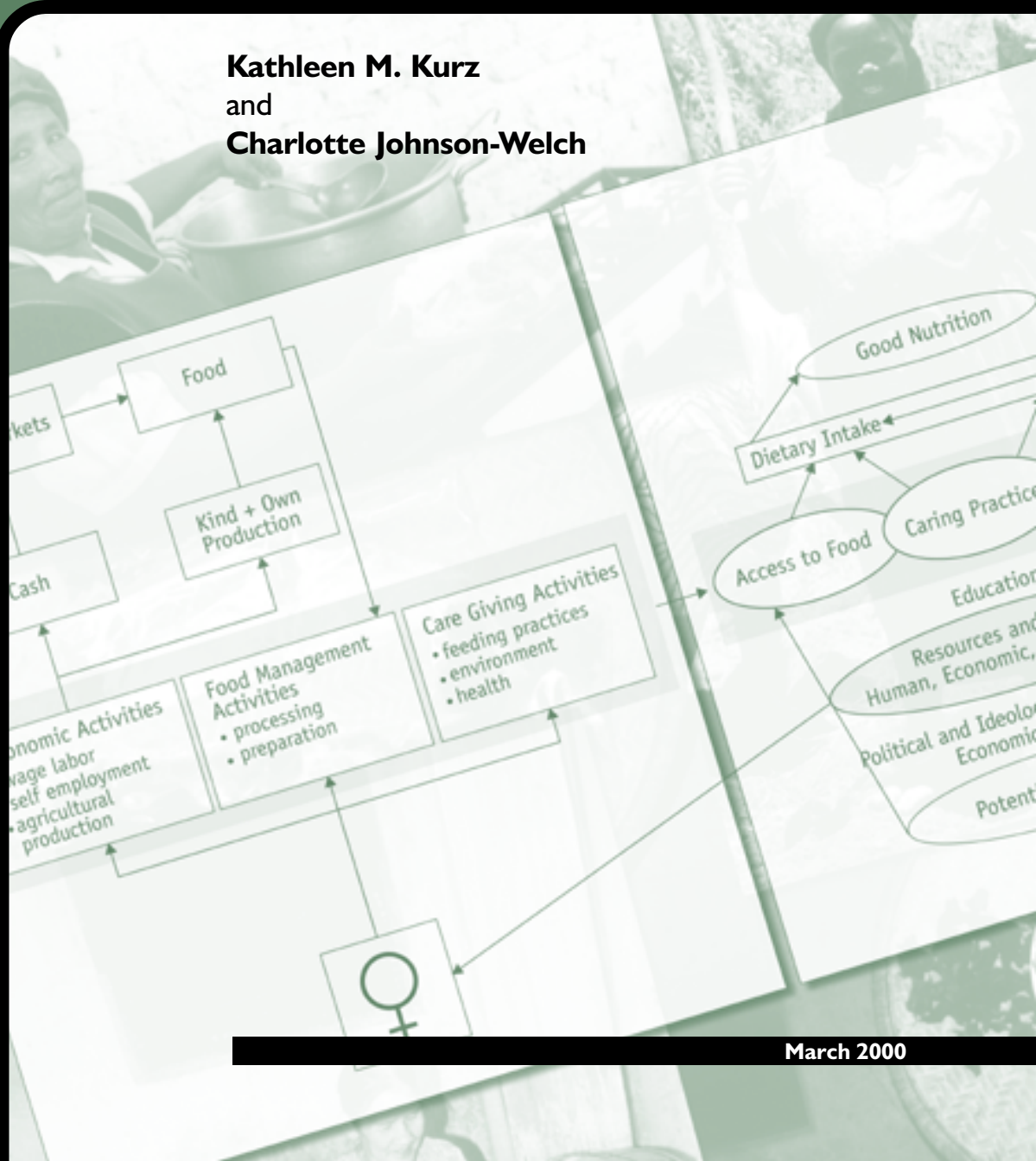


Enhancing Nutrition Results:

The Case for a Women's Resources Approach

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Charlotte Johnson-Welch



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Acknowledgments

We would like to thank the following people for their contributions to this document:

- The ICRW/OMNI research partners and their colleagues at Mahidol University (Thailand), CEPREN (Peru), FARM Africa (Ethiopia), Tanzania Food and Nutrition Centre (Tanzania) and the National Potato Research Centre, the Kenya Agriculture Research Institute and the International Potato Centre (Kenya), whose research showed us how this approach worked in the field;
- Barry Popkin, University of North Carolina; Sonya Rabeneck, ACC/SCN; Chessa Lutter, Pan American Health Organization; Susan Burger, Helen Keller International; Eleonore Seumo, CARE International; and Katherine Dickin, Cornell University, whose technical review contributed significantly to strengthening how we stated our case;
- Our ICRW colleagues, especially Sarah Gammage, Ana Pieczanski, Annelies Drost-Maasry, and Miriam Escobar, who were important members of our research team and who provided support, encouragement, and substantive input through the life of the ICRW/OMNI Research Program; and Rekha Mehra, who provided intellectual guidance, clarity of thought, and a sense of vision that kept us on track and fixed on our objective; and
- Dr. Frances Davidson and Dr. Tim Quick, Office of Health and Nutrition, U.S. Agency for International Development; Dr. Suzanne Harris, International Life Sciences Institute; and Dr. Paula Trumbo, formerly at ILSI, who were willing to invest in our idea and, through us, the research teams and women in developing countries.

Introduction

Over the last two decades, the nutrition of young children and mothers around the world has been improved, thanks to research, policy changes, and programmatic investments (ACC/SCN 1997a,b,c; ACC/SCN 1992; Gillespie and Mason 1991). Worldwide prevalence of underweight (low weight-for-age) in children 0-5 years, an indicator of short-term nutritional changes, dropped from 38 percent in 1980 to 34 percent in 1990. Similarly, rates of childhood stunting (low height-for-age), an indicator of nutritional status in the longer term, have dropped from 49 percent in 1980 to 40 percent in 1995 (ACC/SCN 1997c).

Despite these gains, the rates remain unacceptably high, and progress is uneven between and within countries. High rates of stunting remain in South Asia, Southeast Asia, and sub-Saharan Africa (54, 38, and 39 percent, respectively). This is of particular concern to development practitioners and policymakers because stunting captures the cumulative effect of poor nutritional status, and serves as a proxy for the effects of social and economic development on child well being.

It is the premise of this paper that, although some additional improvement could occur through the full implementation of existing approaches, future reductions in the high rates of malnutrition worldwide will be limited unless those who design, test, and implement nutrition programs adopt a new generation of approaches to reduce it. New approaches should focus on sustainable strategies that families can use to promote the nutritional status of their own members. One approach that deserves concerted attention is strengthening women's roles in promoting their families' nutrition.

Women have large, important roles in taking care of their families, especially the youngest children

who are the most vulnerable (McGuire and Popkin 1989, 1990; Holmboe-Ottesen et al. 1989; MacCormack 1988; Huffman 1987). A key aspect of women's diverse roles is their participation in economic activities. In fact, in poor families women work out of economic necessity; it is essential that they earn income to be able to adequately care for their families (Mehra and Gammage 1999). This is particularly the case in households that are female-headed or female-maintained.² And so women's productive and reproductive roles are inextricably linked. The types of care women provide their families, combined with the conditions of the economic activity in which they participate, determine whether family nutrition and welfare ultimately benefit.

The central question of this paper is: If women are the primary caregivers in their families, how can their ability to carry out their roles be strengthened so they can improve and sustain the nutritional status of their family members? This paper will attempt to show that the key to achieving better family nutrition is through ensuring that women have the set of resources they need to carry out their primary caretaker role, including the decision-making authority to use those resources to the family's optimal benefit (Mehra 1994; Desai 1993, McGuire and Popkin 1990; Leslie and Paolisso 1989; Rogers and Youssef 1988; Piwoz and Viteri 1987; Jolly 1985).

In the last few years, other voices have also called for a focus on the situation of women if the

... future reductions in the high rates of malnutrition worldwide will be limited unless those who design, test, and implement nutrition programs adopt a new generation of approaches to reduce it.

²A female-headed household is one in which a woman has the day-to-day responsibility for maintaining that household, whether an adult male resides fulltime, partially or not at all in the household. A female-maintained household is one in which the woman contributes greater than 50 percent of the household income whether an adult male resides fulltime, partially or not at all in the household.

nutritional status of the family is to be improved. Recently articulated as the “South Asian enigma,” Ramalingaswami, Jonsson, and Rohde (1996) have asked, “Why are child malnutrition rates higher in South Asia than in sub-Saharan Africa even though each has similar poverty rates and public expenditures in health, and South Asia has more food availability?” Their analysis is that the answer lies in the low social status of women in South Asia, specifically that undereducated women with only limited economic opportunities are unable to fully protect their families’ nutrition. Furthermore, a UN committee on nutrition has called for action, saying that malnutrition is:

...not simply the result of inadequate food availability or inadequate access to health services and a clean environment. The quality of care and feeding offered to children, which is critically dependent on women’s education, social status and workload, is now seen as a significant contributing factor. Special efforts should include the improvement of the situation of women (ACC/SCN 1997b).

This call for a focus on the situation of women may, in fact, be a response to a broad demand for research that is more program- and policy-oriented so that greater strides can be made in figuring out *how* to reduce rates of malnutrition (Berg 1992), as well as to the charge that nutritionists need to develop a “public nutrition” approach (Beaudry 1999; Mason et al. 1996).

Whatever the impetus for these recent calls, this paper demonstrates that an approach focused on women is feasible, in addition to necessary. To explain how to achieve the improvements for women that will allow them stronger roles in improving their families’ nutrition and well-being, a framework is presented in which these concepts can be shown in their component parts, followed by examples showing that interventions in this direction can improve nutritional status, and finally, by recommendations for action.

This paper does not describe in detail the constraints women face in meeting their multiple responsibilities, because this has been done before (McGuire and Popkin 1989, 1990; Holmboe-Ottesen et al. 1989; MacCormack 1988; Huffman 1987). It aims to show, instead, *how* investments in women—as income earners and agricultural producers, as food processors and preparers, and as caregivers and health promoters—can be made and *how* those investments can yield nutritional results.³ It also attempts to dispel the myth that making investments in resources women need is an indirect and, therefore, inefficient path for improving nutritional status. The ultimate goal of this paper is to convince program officers, researchers, and policymakers in the nutrition arena that making these investments is fundamentally feasible and effective.

³ In a few studies reported here, the effect of men’s income or resources on child nutritional status was contrasted with women’s, but in most cases the focus was on women’s income and resources.

A Conceptual Framework

The conceptual framework presented here illustrates the flow from what women need to perform tasks to how those tasks contribute to nutrition (see figure 1 on pp.6-7). The framework was developed based on research conducted in five countries that explored how to achieve micronutrient outcomes through a woman-centered approach (Johnson-Welch 1999). It begins with a UNICEF model (see area on p.7) showing the factors needed for good nutrition of people of all ages, including the most vulnerable children 0-5 years of age (UNICEF 1998). The most immediate factors contributing to good nutritional status are dietary intake and health. Good dietary intake and good health of individuals are in turn influenced by their access to food, the care they receive, and the health care services they are able to access. Many elements and details of the relationships among these three levels are well understood (Engle, Menon, and Haddad 1997), and many of the programs and policies necessary to promote the relationships have been considered or are already occurring within programs.

The model also indicates that adequate access to food, to care, and to health services is dependent on a further set of basic contributing factors. Within a family, women who procure food, take care of its members, and promote family health need resources to be able to do so. Resources include economic inputs (such as improved seeds or fertilizer) to increase production, or equipment (such as seed presses or grain mills) to reduce time and labor demands while increasing production. Women also need skill training in the use of

technologies or business practices. Other resource needs are institutional in nature: financial services, water and sanitation services, and health delivery systems. Also, social networks—whether extended family networks or acquired community networks based on common needs—are resources because they provide women with access to labor and other productive resources such as credit. Finally, and most fundamentally, women need education, good health, and good nutritional status—as it is their human capital that drives and maximizes the utility of the other types of resources.⁴

This critical part of the framework (labeled as “basic factors”) indicates that because women acquire food, take care of family members, and prevent or treat family health conditions, ensuring women’s access to necessary resources is a central issue.⁵ Unlike the preceding three levels of variables, however, the relationship between the extent of resources women have (resources which allow them to access food, care for their family, and promote their family’s health) and the actual dietary intake, health, and, ultimately, the nutritional status of their family has received relatively little attention.

It is the purpose of this paper to describe the resources women need to enhance their contributions to nutrition and to show the subsequent effect on nutritional status. The elaboration of these resource issues is guided by the left side of the framework (see p.6). Women acquire or use nutrition-related resources according to three sets of activities: economic activities, including wage

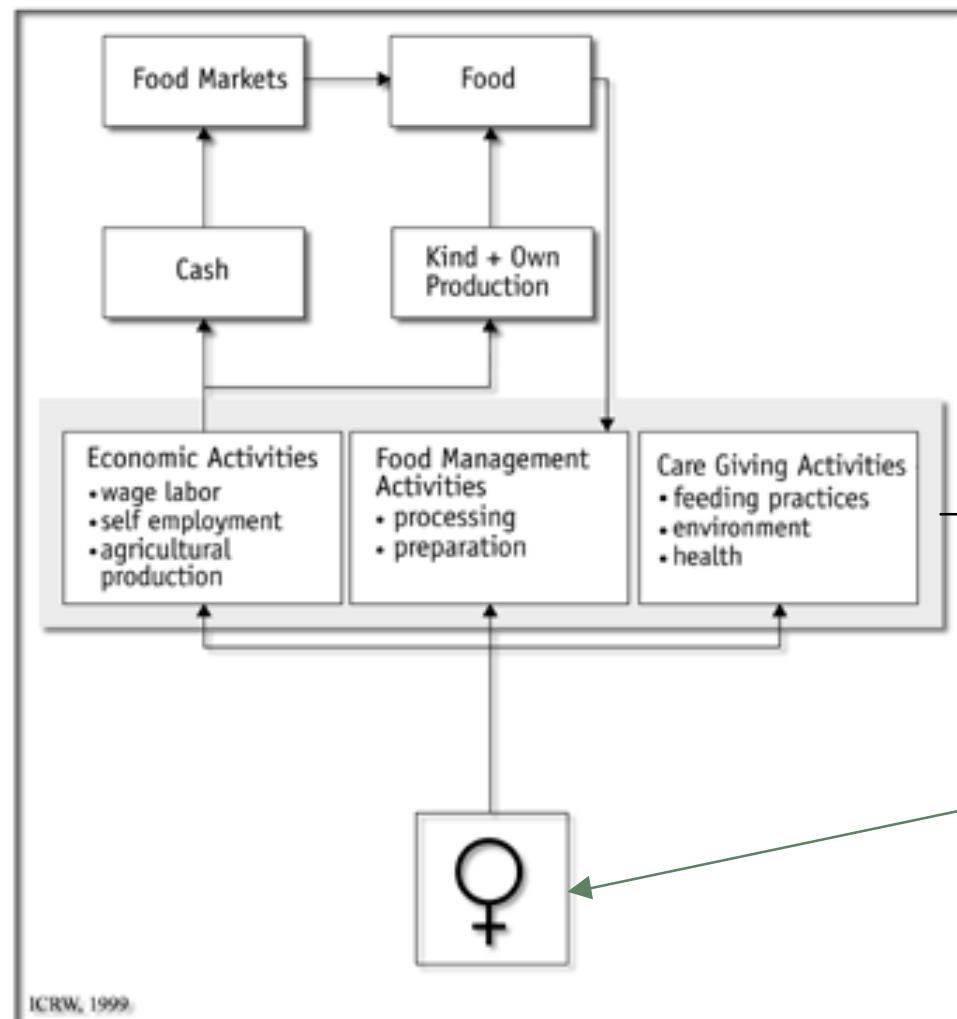
⁴ In some frameworks time is listed as an important resource (Leslie and Paolisso 1989; Saito et al. 1994). Women make choices among activities in their caretaker and income-earning roles when they feel they do not have enough time to perform all of them well. That some activities are not performed may have negative consequences on the family’s nutrition and well being, for example, a sick child not being taken to clinic. In this paper, we do not list time as a resource because time itself cannot be created. Instead, we discuss labor-saving technology and other resources that save women time by increasing their efficiency or productivity. Time, then, becomes a cross-cutting issue and examples of resources that save women’s time are described in many of the sections that follow.

⁵ While the political and ideological superstructure, the economic structure, and political resources in turn influence the resources, and therefore nutrition, as shown in Figure 1, this paper places its focus on resource allocation within the family, especially to the women.

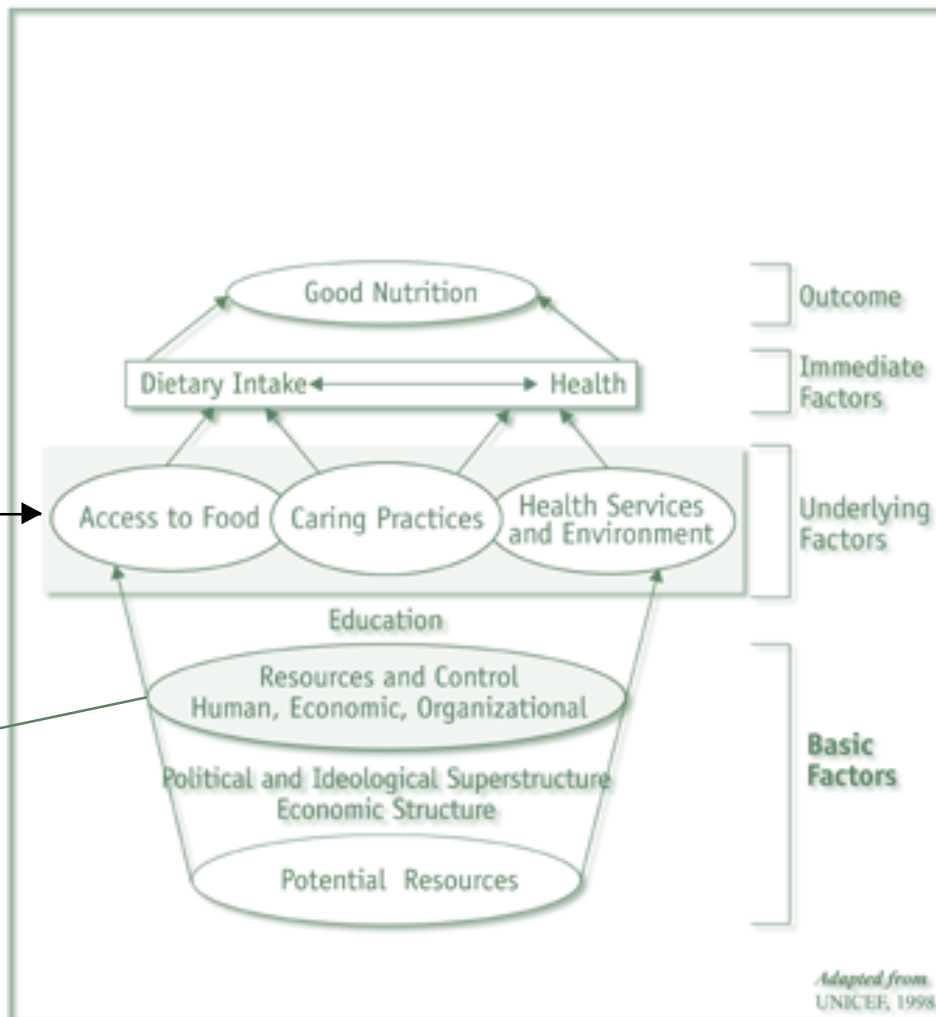
labor, self employment, and agricultural production; food management activities, including processing and preparing food; and care giving activities, including feeding practices, health promotion, and health seeking behavior. What is

critical is that women have adequate resources to effectively carry out these three sets of activities, thereby enabling them to provide for the nutritional needs of their families. In the framework below, economic activities are divided to show

Figure 1. Linking women's access to resources and nutrition



that women are likely to earn cash from some economic activities like wage labor and self employment, enabling them to buy food, as well as get food itself when their economic activity is agricultural production.



Women's Contributions to Family Nutrition

Women contribute to their families' nutrition through earning and expending income, through producing and processing foods, and through seeking and providing care for their family members.

Earning and Expending Income

Women are economically active in a broad range of sectors, and spend a higher proportion of the income they earn on food and other basic needs than men do.

Women's income may be used to buy food, vitamin supplements, immunizations, medications, or to pay fees for health services. They work in the formal, semiformal, and informal labor markets, and earn income as wage laborers or as salaried employees in different economic sectors including agriculture, manufacturing, retail and commerce, and services (see table 1). (Women's agricultural work and food production are discussed more fully in the next section.)

Women also earn income through their own enterprises and by selling products in markets (Draper 1996; Moreno-Black and Leimar Price 1993). These income-earning opportunities rest within the control and management of women and, therefore, put income directly into women's hands (Sebstad and Chen 1996). In addition, their expenditure-replacement activities, such as hauling water, caring for basic health needs, and cleaning their homes and surrounding areas, frees up household income that might have been used to purchase similar services. This unspent income can then be used for other purposes, including buying food or health care services.

Since women tend to spend income directly on the purchase of goods and services that promote the nutrition, health, and general well being of their families, increasing women's income can have a greater effect on those outcomes than increasing men's income. For example, data from Brazil suggested that income managed by women

Table 1. Sectoral distribution of women in the labor force (percentages)

Region	1970			1980			1990		
	Agric.	Manuf.	Services	Agric.	Manuf.	Services	Agric.	Manuf.	Services
Sub-Saharan Africa	30	18	28	36	28	30	37	28	36
North Africa	5	11	9	10	25	15	20	23	17
South Asia	17	12	9	20	18	11	32	41	15
East & Southeast Asia	34	41	33	37	42	35	34	44	41
China	N/A	N/A	N/A	46	44	35	47	43	38
Latin Am & Carib.	12	29	43	15	29	44	16	36	48
Middle East	12	12	12	14	12	16	12	10	17
Newly Indepen. States	50	38	47	49	43	53	45	43	56
OECD	25	27	40	31	28	45	33	29	48

(Source: Mehra and Gammage 1999)

Table 2. Effects of income earned by men and women on household welfare indicators

Country	Effect on	Effect of women's income	Effect of men's income	Ratio of effect: income earned by women/men
Kenya	Household calorie level	Positive	Negative	—
Guatemala	Food expenditures	Positive	Positive	2.0
Brazil	Child weight for height	Positive	Positive	4.2
Brazil	Child survival	Positive	Positive	18.2

(Adapted from Quisumbing et al. 1995)

was associated with about a three percent increase in food expenditures as opposed to only 0.6 percent in the hands of men, and the difference was statistically significant (Thomas 1997). Thomas showed that women also tended to invest in foods that were associated with better health of their family members, and the gender difference in income expenditures on food and health were reflected in child nutritional status. Indeed, according to the study, child weight-for-height increased eight times faster if income was in the hands of women than in the hands of men, a statistically significant difference.

Similarly, a study in Kenya showed that children from female-headed households had significantly better nutritional status (both height-for-age and weight-for-age) than children in male-headed households (Kennedy and Cogill 1987). These female-headed households were also poorer on average than male-headed households; thus, the higher nutritional status was being mediated by factors other than income. The authors hypothesized that these women made more decisions about allocation of resources within their households than did women from male-headed households. Data from Malawi also show that "...although their per capita expenditures are only 74 percent of those of male-headed households, *de facto*⁶ female-headed households provide a level of household caloric adequacy that is 95 percent of the male-headed households" (Kennedy and Peters 1992). Similarly in Chile, child height-for-age was significantly greater in households where

mothers earned more than half of the family's income and had greater control of decision-making power over family resources (Buvinic et al. 1992).

Comparing studies in East and southern Africa, Kennedy and Peters (1992) also found that women spent a higher proportion of their income on food than men. Income controlled by women had a positive impact on household caloric intake in addition to the overall positive effect of total income on caloric intake. Similar findings were found in a study in the Indian states of Kerala and Tamil Nadu: "...regardless of how much a woman earns, she gives a fairly high percentage to her household [maintenance costs], always a much higher percentage than that given by her husband or other male household members" (Mencher 1988). See table 2 for an overview of effects of income earned by women versus men in a variety of settings.

The effect of women's income is also beneficial to women's own dietary intake (Bisgrove and Popkin 1996). In a study of 28,000 households in metropolitan Cebu, in the Philippines, data on women's occupations, income, and dietary intake were collected for 3,327 women who gave birth between May 1983 and April 1984. Analysis of this data for 938 women at 14 months post-partum found that women's work significantly improved their dietary intakes of energy, protein, fat, calcium and iron, notably as a result of consuming commercially prepared foods. Further-

⁶ *De facto* is used in the same manner that "female-headed" is used earlier in this paragraph.

more, women with low incomes and women who worked in the informal sector benefited more from this income effect than did women with higher incomes and those who worked in the formal sector.

Food Production and Processing

Women also contribute to family nutrition by bringing food into the household. They do this through agricultural work in subsistence crops and in cash crops, by gathering wild foods and producing minor crops such as sweet potatoes, and by acquiring donations or in-kind services. Once the food enters the household, women process and prepare it for consumption.

Women's significant contribution to the agricultural production of subsistence crops is highlighted in a UN report:

Rural women are responsible for more than 55 percent of the food grown [worldwide]; in Africa, they produce 70 percent of the food. Moreover, women comprise 67 percent of the agricultural labour force in developing countries. [Further] women in sub-Saharan Africa contribute 60 to 80 percent of labour in food production for both household

consumption and sale, while the proportion of women involved in the economically active agricultural labour force ranges from 48 percent in Burkina Faso to 73 percent in the Congo... Asian women account for 50 percent of food production and their participation in the agriculture labour force ranges from 35 percent in Malaysia to 60 percent in Thailand. In Latin America and the Caribbean, women represent a smaller part of the agriculture labour force but continue to play significant roles in subsistence farming, poultry and small animal production for domestic consumption (United Nations 1997).

Table 3 illustrates women's significant role in agricultural work by country, especially in sub-Saharan Africa.

In addition to subsistence production, women also contribute to cash crop production. This contributes to household nutrition in two ways. Women may work as wage laborers (in someone else's fields) thereby earning income that may be used to purchase foods and meet other household consumption needs. They may also work in family fields, and contribute labor directly to the

Table 3. Women in agricultural labor force as percent of women in labor force

Regions and Countries	Percent	Regions and Countries	Percent
Sub-Saharan Africa (1990)		Asia	
Cote d'Ivoire	70	India	24
Guinea-Bissau	90	Indonesia	35
Malawi	91	Thailand	50
Senegal	88		
Uganda	83		
Near East & North Africa (1988)		Latin America & the Caribbean	
Morocco	32	Brazil	10
Jordan	30	Costa Rica	2
Turkey	54	Mexico	12

(Source: FAO 1998; Mehra 1994; Flynn & Oldham 1999)

household production of cash crops. While sale of these crops means more income for the household, it may not translate into nutritional benefits as the disbursement of that income may not rest with women. In this case, women's contributions to nutrition may be indirect, that is, increased production that may translate into more food in the market.

Yet another way that women produce food for their families is by gathering wild foods and by cultivating minor crops, including sweet potatoes, vegetables, fruits or secondary grains (Moreno-Black and Leimar Price 1993; Longhurst 1986; Fleuret 1979). The importance of these foods is particularly great during the pre-harvest period of major food crops and when crops fail.

In Kenya, new varieties of sweet potatoes rich in beta-carotene were introduced to women farmers with an end goal of improving vitamin A intake of young children, thereby preventing vitamin A deficiency. The Kenyan study showed a significant increase in the intake of vitamin A-rich foods (38 percent, $p = 0.0015$), according to the food frequency methodology developed by Helen Keller International (Rosen et al. 1993), among children whose mothers received both the production-focused intervention of planting materials and access to agricultural extension services, and the consumption-focused intervention of nutrition education and training in food processing and preparation. This compared to a decrease in vitamin A food intake (30 percent, but not statistically significant) for children whose mothers received only the production-focused inputs (Hagenimana et al. 1999). This example suggests that: (a) women's farm production offers an entry point for interventions that can improve nutrition; and (b) interventions that increase women's agricultural productivity and increase their health and nutrition knowledge may yield more benefits than ones that target only productivity or only knowledge.

Once food is produced and enters the household, women are principally responsible for processing

it. Food processing can often improve the nutritional quality of foods and increase dietary diversification. Women process oilseeds, such as sunflower or sesame seeds, to produce cooking oil; transform cassava into *gari*⁷; smoke and dry fish and meat; and process and preserve fruits and vegetables (Mehra 1996; ECART 1994; McSweeney 1979). Thus, women's roles in food processing offer yet another entry point for interventions that can enhance family nutrition.

In central Tanzania with only one rainy season, drying vegetables is an important food processing technique for trying to maintain a year-round supply of vitamin A-rich foods. In a recent study there, new solar dryers were developed to respond to women's preferences for small, household-sized units, and to their desire to have choices about costs and construction (cheaper mudbrick or more expensive wooden). An intervention combining health and nutrition education with improved solar dryers enabled women to increase children's vitamin A intake and year-round availability of dark green leafy vegetables (Mulokozi et al. 2000). The frequency of consuming vitamin A-rich foods (HKI scores) increased between baseline and the post-intervention period 18 months later significantly more in the intervention communities than in the controls ($p < 0.01$), especially among those who adopted the new technology. This suggests that the availability of dried dark green leafy vegetables and their consumption by young children 0-5 years old could contribute to reducing vitamin A deficiency in this age group.

Care- and Health-Promoting Practices

A third way in which women contribute to nutrition is by taking care of their families' health and development needs. These include use of health services for prevention, including immunizations, vitamin A and iron supplements, and growth monitoring; treatment and remedial care; breastfeeding and other feeding practices; and

... women's roles in food processing offer yet another entry point for interventions that can enhance family nutrition.

⁷ Gari is a staple food product derived from cassava, a plant of tropical America and Africa cultivated for its tuberous roots.

engaging children in activities that stimulate their intellectual and emotional growth and development (Engle, Menon, and Haddad 1997; Food and Nutrition Bulletin 1999; Range, Naved and Bhattacharai 1997; Leslie and Paolisso 1989).

Although there is a recently burgeoning literature on care practices, the following examples are some of the few that illustrate the important contributions these practices make to family nutrition.

Ruel and colleagues (1999) found in Ghana that receiving good caring practices—defined in this study as child feeding and use of health services for growth monitoring and immunizations—were strong determinants of children's height-for-age. They suggest that, even as long-term investments

are being made in women's access to resources and human capital, immediate gains can be achieved by improving women's childcare practices.

In Bangladesh, children (6-18 months) who were growing well were fed at or before mealtimes; had greatest dietary diversity of all children in the sample; had foods prepared specially for them; and had breastfeeding mothers with the fewest dietary restrictions (Range, Naved and Bhattacharai 1997). It was interesting to note in this study that although income explained some of the variation in nutritional status in the entire sample, only the care variables were significant predictors of improved growth.

Resources that Support Women

While the activities in which women engage can contribute to their families' nutrition, the degree to which their families can benefit from these activities depends on the number and amount of resources women have available. This section focuses on the resources needed to improve women's efficiency and productivity, and makes the argument that an investment in these resources would lead to a new generation of improvements in nutrition worldwide.

There are two caveats about the information in this section. First, although it is divided into specific resources, the interventions featured are often designed as a package of several resources. There are few examples of single-component interventions offered to communities, which usually have multiple needs. This means any improvement in nutritional status is to be attributed to the resource package and not to any one component of it (Johnson-Welch 1999). Second, the literature on the impact of resources in women's control is much larger than is reviewed here. The cases included here are those that have been evaluated for nutritional improvements or are likely to improve nutrition.

The key resources that women need to become more efficient and productive fall in the cate-

ries of production-focused inputs, labor-saving technology, microfinance for women, social networks and support, and women's own human capital.

Production-focused Inputs

Production-focused inputs are defined here as the physical factors that would improve the efficiency or productivity of an economic activity, such as improved seeds and fertilizer in agricultural work. Land is also an important input, and it is expected that when women own or control land, their families' nutrition would benefit, but specific evidence on its nutritional impact was not found. Labor-saving technologies and financial services are considered to be other important resources, and are discussed separately below.

In general, if women had as much access as men to resources such as land and agricultural inputs, as well as education, training, and credit, their productivity would increase, as shown through data from Kenya (see table 4).

Similarly, in Thailand and Korea, researchers found women farmers to be as efficient as men after controlling for education, age, and production-focused inputs (Quisumbing et al. 1998). And in Ethiopia, when female-headed households

Table 4. Returns to increasing human and physical capital of women farmers

Study site	When Women Have:	Yield Increases:
Maize farmers, Kenya (1976)	Age, education, input levels of male farmers	9.0 percent
	Primary schooling	24.0 percent
Food crops farmers, Kenya (1990)	Age, education, input levels of male farmers	22.0 percent
	Same land area as male farmers	10.5 percent
	[Same] fertilizer level as male farmers	1.6 percent

(Adapted from Fong and Bhushan 1996)

had access to the average values of inputs that male-headed households had, the gross value of outputs was 1.3 percent higher for the female-headed households (Addis et al. 1999). Increasing women's access to these inputs, therefore, would improve overall agricultural productivity and increase food available to their families.

In Bangladesh, longitudinal data collected by Helen Keller International suggest that improving women's access to production-focused inputs contributed to increases in vegetable production and household income, as well as improved children's nutritional status (Marsh et al. 1995). Women received seeds and seedlings, training in production and storage techniques, and health and nutrition information to encourage production of backyard gardens for home consumption and commercial sale. Household income rose by 12 percent through the sale of vegetables. Further, because they were producing vegetables for their own consumption, household expenditures for these foods fell by ten percent, yielding a net increase of 22 percent in household income. Increases in food consumption and income were associated with a larger decrease in percentage of intervention households with severely underweight children (25 to 18 percent) than in control households (22 to 19 percent). Rates of night blindness fell from 2.3 percent to 1.2 percent over two years in the intervention households.⁸

Labor-saving Technology

Another way to increase efficiency and productivity is to improve women's access to labor-saving technologies. For example, women in The Gambia were introduced to an improved manually operated ram press to extract oil from sesame seeds and the effect on women and children's nutritional security was significant (Silva-Barbeau et al. 1997). The study compared mother-child dyads in two sets of communities—80 living in five communities that received the ram press and participated in monitoring women's adoption of the press (intervention group) and 40 living in five matched control communities. This latter group had access

to a motorized and physically larger press; however, these presses were less reliable and were dependent on fuel and replacement parts, which were not always available. The new ram press technology enabled women to produce sufficient amounts of cooking oil for home consumption and sale, and reduced their time constraints.

Data were collected at three points in the year to capture seasonal variations in activities and food availability, including before, during and after the intervention. Dietary intake was measured using two non-consecutive 24-hour dietary recalls and food frequency consumption. Children in households with the new press had significantly larger increases in caloric intakes and significantly improved nutritional status in the lean season than did children in control households, most likely due to an increased consumption of weaning foods and other table foods containing sesame seed oil.

In Burkina Faso, a multi-year, multi-sectoral project supported by the United Nations Educational, Scientific, and Cultural Organization (UNESCO) and the United Nations Development Program (UNDP) led to more meals served to families following introduction of a mechanical grain mill (McSweeney 1979). In this case, women took advantage of the time saved by using the mill to prepare extra meals and different menus, and the result was dietary improvements. Similarly, an intervention study in Ghana that increased women's access to a labor-saving processing technology for production of *gari* yielded improvements in women's and children's nutritional status (Kennedy et al. 1994).

Microfinance

Women's access to microfinance services helps them meet immediate needs as well as future ones through savings. Access to loans also enables women to invest in productivity enhancing tools and equipment and other assets. For instance, access to credit permits women to purchase agricultural inputs, such as fertilizer and improved

⁸ Although statistical significance was not reported, the difference in the change from before to after the intervention period for the intervention and control groups was likely sufficient to be statistically significant, given the large sample size (980 intervention households and 194 control).

seeds, which can enhance their efficiency and productivity; or to purchase medicines that promote family members' health. Credit also enables women to accumulate assets, such as livestock or poultry, and these contribute either directly to household nutrition through production of milk and other food products or indirectly through income generated through market sales. Having an accumulation of assets also provides women with an informal insurance mechanism; in other words, they can sell assets when they need cash; or they can trade them to obtain other goods or services. They can also use assets for collateral.

Women typically do not hold bank loans, however, because they lack the collateral to acquire them. They often prefer to take loans that are smaller than banks issue. A UN report states that "...women farmers receive...less than 10 percent of the credit allocated to small-scale farmers. In five east and central African countries, it is only one percent of the total credit available for agriculture" (United Nations 1997).

Recently, a number of microfinance programs have sprung up to fill this important gap, making small loans available to women (about US \$100), without requiring physical or financial collateral. A microcredit loan is generally made to a group of women, which then monitors the repayment rates of its members. As many as 98 percent of these loans are repaid regularly. Recent experience also suggests that providing women with access to complementary inputs such as general business advice and planning, technical assistance and training, information on equipment and new technologies, markets, and rules and regulations improves the efficiency of financial inputs (Malhotra 1992). Through packages such as these, women's businesses are more likely to expand, become more sustainable, and yield greater benefits, both in terms of income and how it is used.

The child health and nutrition benefits of improving women's access to microfinance, combined

with input delivery and health education, were demonstrated in a program in Ghana (MkNelly 1997). Freedom from Hunger designed the Credit with Education Program to address two gaps that impacted negatively on the nutritional status of children—women's lack of access to financial services (including loans) and their lack of knowledge about how to care for and feed their children. Village banking services and business training for rural women were combined with education in appropriate breastfeeding, child nutrition, diarrhea treatment and prevention, immunization, and family planning practices.

The nutritional status and health of one-year-old children of participating mothers was significantly better after three years of the program compared to one-year-old children of mothers from a group in the intervention communities who did not participate and also compared to those from control communities. Height-for-age Z-scores⁹ improved 0.3 points among participant children, whereas they fell among children with mothers who did not participate and with mothers from the control areas (-0.13 and -0.11, respectively, $p = 0.01$). Weight-for-age Z-scores of children of participating mothers were also significantly higher. More participating mothers gave colostrum to their newborns rather than discarding it; more exclusively breastfed for longer; and fewer reported ever using a feeding bottle, a source of fecal-oral contamination. Participants' children also were found to have solid food diets of higher nutritional quality. The children were more likely to meet caloric intake requirements, and mothers were more likely to know how to prevent and treat diarrhea. The interest earned from loans enabled Freedom from Hunger to fund 80 percent of the operating costs of the program.

Use of credit to enhance access to livestock was demonstrated in a recent study in Ethiopia to yield nutritional benefits when combined with other inputs and information. A program to provide women access to crossbred dairy goats was supplemented by agricultural inputs and

⁹ Z-scores, which are two standard deviation units from the mean of NCHS reference data, are used to measure nutritional status.

health and nutrition information to improve dietary diversification (Ayalew et al. 1999). Assessments were made before and after the intervention period. Results showed that young children were at lower risk of being vitamin A deficient, assessed by dietary intake and clinical signs, if they lived in families that owned livestock and had participated in the intervention program (see table 5). Access to resources enabled women to change their care and feeding practices to the benefit of children.

Social Networks and Support

In addition to increasing women's efficiencies and productivity, another method to reduce women's time and labor demands is to draw on others' labor. This is often done through a network of friends and family, civic participation, and group membership (Pinstrup-Andersen 1999). These networks provide women direct access to labor, financial assistance, food, childcare, information, and contacts, or assist women in an intermediary capacity to access those resources. Moreover, women's social networks permit them to share risks, practice new behaviors, try new food crops, and supplement their labor when food shortages and other external pressures constrain their ability to meet their family's nutrition needs alone.

The contributions of family networks to child nutrition were shown in rural Malawi (Low 1995). Data were collected over 18 months to explore factors related to food and nutritional security in three agri-ecological zones. Information on family

characteristics, including the number of members and their relationships, and primary residence (urban or rural; in Malawi or abroad) and their contributions (food or non-food items) to the sample households were used to construct indices that represented inter-household exchange networks for women and for men. Results indicated that family members based in urban areas or abroad contributed more to child nutritional status (height-for-age Z-scores) than did rural networks, and women's relatives had a stronger influence on child nutritional status than did men's. Low suggests that the exchange network variables are "reasonably strong proxies for access to income, particularly the ratio of reciprocity and urban/abroad variables..." especially for women. This implies that reciprocity networks may cushion women and children from external shocks that are beyond the immediate control of an individual or household.

Studies in Guatemala, India, and Peru also demonstrated the important contribution that social networks make to improved nutritional outcomes. A Guatemala study found that when children (one to two years of age) of working mothers were cared for by an adult rather than by a sibling the health of children and height-for-age (at four years) were significantly improved (Engle 1989). And social networks through women's clubs in Hyderabad, India, and community kitchens in Peru, in which members make a large number of luncheon meals that they use themselves in payment for their volunteer time and also sell to others, also led to

Table 5. Impact of participation in the intervention on nutritional outcomes in Ethiopia^a

	Participated in trial intervention	Didn't participate in intervention	Impact of intervention ^b
Child in the top quintile of the HKI scores	0.49	0.37	20 %
Household had a vegetable garden	0.38	0.13	25%
Child consumed milk more than 4 times a week	0.76	0.51	22%

^a These results are adjusted for other determinants of the expected outcomes.

^b Differences are significant at $p < 0.01$.

improved nutritional outcomes (Carrasco Sanes et al. 1998; Huffman 1987).

An underutilized source of social support for women's contributions to nutrition is men. Although role differentiation occurs at the household level, men play several critical roles in supporting their families' nutrition. First, they are often both the gatekeepers of income and assets in the household and have strong influence over the allocation of the benefits that accrue from those within the household. Second, men's opinions may influence how women choose to eat or not eat. Research from Mexico suggested that women limited their food consumption during pregnancy because their husbands did not want them to gain much weight (Parker et al. 1990). A similar pattern was found in a Thai refugee camp of Khmer and Vietnamese refugees. In this case, the nutrition education was redirected to the husbands to encourage greater food consumption among their wives who were pregnant. The intervention group had significantly higher knowledge scores about dietary intake during pregnancy than the control group. Moreover, women in the intervention group also had significantly higher average weekly weight gains (Parker et al. 1990).

In a pilot study to improve children's nutritional status and that of pregnant and lactating women, CARE/Cameroon targeted men as a key intervention group. Field workers met with men and discussed the importance of improving women and children's nutrition, and their potential role toward that improvement. Nearly all the men in the intervention began to support their wives' efforts to try new care and feeding practices. Further, the women reported that they were more willing to try the new practices because of their husbands' support (Seumo, personal communication). This proactive effort is a good example of how recognizing men's influence on family decisions and behaviors, and actively engaging them in the process of designing and implementing interventions to improve family nutrition, can enhance the outcomes of those interventions.

Identifying the support systems that women use in caring for and feeding their families and in earning income and producing food is an important first step in intervening to ensure these critical mechanisms are responsive to women's needs.

Women's Human Capital

Another resource women need to improve their ability to earn income and care for their families is to be strong themselves in mind and body, i.e. to improve their own human capital. And women's human capital is strengthened by investments in their leadership capabilities, education, nutrition, and health (Baker et al. 1996; Merchant and Kurz 1992; Parker et al. 1990).

These investments enable women to better process information, to adopt new practices and technologies, to use health services, and interact effectively with health care professionals. Also, their newborns are less likely to have low birth weight and more likely to be healthier (Smith and Haddad 1999). The converse is that if women's human capital is compromised, they are less able to meet their income earning and caring roles. In fact, the illness or death of a mother severely limits the survival of her children (Save the Children 1999).

Leadership capabilities. A critical element of women's human capital is women's leadership capabilities. In Thailand, women were trained in problem-solving methodologies and community mobilization techniques (Smitasiri and Dhanamitta 1999). They applied what they had learned to work with their communities to identify solutions to reducing vitamin A, iron and iodine status. The interventions included school-based distribution of iron supplements to adolescent girls; improvements in nutritional quality of school and home-based meals by including oil, vitamin A- and other nutrient-rich foods; health and nutrition education in the schools and community; and local production of iodized salt. Baseline and post-intervention data from intervention and control communities were compared, and the findings included significant differences

in vitamin A intakes among young children 2-5 years old, young adolescents 10-13 years old, and pregnant and lactating women; and vitamin A, iron, and iodine status among the young adolescent girls in the intervention communities as compared to those in the control communities and in comparison to baseline.

Another example of how an investment in women's leadership can yield nutrition benefits is provided by a recent study in seven community kitchens (*comedores*) in Peru. Over an 11-month period of time, kitchen members participated in a series of training and problem solving workshops that aimed to strengthen their decisionmaking and leadership skills. They received health and nutrition information; developed and tested recipes that included locally available iron-rich foods; and learned how to adapt preparation and serving methods used at home to those more appropriate to a larger scale production. Women also were trained as quality assurance supervisors to ensure the new standards and procedures were implemented in consistent fashion. As a result of their efforts, there were significant improvements in women's iron status and reduced rates of anemia (Carrasco Sanes et al. 1998). Heme iron, bioavailable iron and vitamin C intake improved significantly among members and anemic women, but not among non-members. Prevalence of anemia dropped significantly (from 49 percent to 41 percent, $p < 0.05$) in the intervention group.

Education. The benefits of investing in women's education to build human capital are well established (Summers 1992). Educated women "...have their first child later, make greater use of health services, and are involved in work that generates more income for themselves and their families" (Merchant and Kurz 1992). A recent study in Ghana found that maternal education was the most important predictor of good caring practices (Ruel et al. 1999). Further, women who are educated are more likely to adopt agricultural and other technologies that increase productivity and efficiency (Quisumbing et al. 1998).

Nutrition. Improving women's general nutritional status is another investment in their human capital, and can be accomplished through several means — by decreasing their energy expenditures, and by increasing their nutrient intake. Labor-saving technologies, which are described in an earlier section, help decrease energy expenditures. By improving women's productivity and work efficiency, these technologies also contribute to women's nutritional status by reducing their workload and energy expenditure. For instance, the *gari* processing technology was an improvement over traditional *gari* processing methods that were heavily labor intensive, thereby reducing women's energy expenditure while increasing production of the food (Kennedy et al. 1994). Other technologies that have this dual benefit include wells or piped water systems that are close to women's homes, and fuel-efficient stoves that reduce the need for fetching firewood (Leslie 1991).

Reducing micronutrient deficiencies in women, in addition to in their children, is yet another investment in their human capital. Recent intervention trials found that vitamin A or beta-carotene supplementation in Nepal reduced maternal mortality and severe morbidity (West et al. 1999; Christian et al. 1998).

Regarding iron status, a review of data on the economic consequences of iron deficiency (Ross and Horton 1998) indicates that reducing iron deficiency among children yields improvements in their cognitive development and, if projected into adulthood, these improvements can affect hourly earnings and wages. Iron deficiency anemia causes tiredness, lethargy, and fatigue, and it impairs work capacity (CDC 1998). In fact, when women adult tea plantation workers received a daily iron supplement, their daily activity was 80 percent greater than among matched pairs of controls.

Health investments. And finally, improving women's health is an investment in women's human capital that furthers their ability to earn

income and care for their families (Tinker et al. 1994; Koblinsky et al. 1993). While recognizing that the consequences of poor health during infancy and childhood impact on adult women's health, this paper focuses on their health as youth and adults. Women's productivity is negatively impacted when they suffer from parasitic, skin, and infectious diseases (McDermott et al. in Koblinsky 1993). Episodes of malaria negatively affect women and, if these occur during pregnancy, can contribute to low birth weight (Wijeyaratne et al. 1992). Women's reproductive health problems such as reproductive tract

infections, HIV/AIDS and other sexually transmitted diseases, post-abortion and obstetric complications such as hemorrhage, and obstructed labor also impact on their ability to be economically active and provide for their families (Huntington and Piet-Pelon 1999; Vernon and Foreit 1998; Population Council 1995; Germain et al. 1992). The range of health problems that women face and the factors, including gender, poverty, and social status, that influence women's health suggest the need for broad investments through a comprehensive approach.

Conclusions and Recommendations

To repeat the central question of this paper: If women are the primary caregivers in their families, how can their ability to carry out their roles be strengthened so they can improve and sustain the nutritional status of their family members? A review of a number of studies has shown that substantial reductions in rates of malnutrition, especially among infants and young children who are most vulnerable, can be accomplished through interventions designed to increase women's access to resources that support their income earning and care giving roles—a women's resources approach.

This approach enables women to carry out these dual roles more comprehensively. Typically, nutrition interventions tend to focus on the immediate contributing factors shown in Figure 1. For instance, health and nutrition education and skill training activities may aim to change feeding practices as a means to improve energy intake and, therefore, weight and height. Programs may distribute vitamin and mineral supplements to increase micronutrient intake and status or support water well and latrine construction to improve environmental sanitation. They may train community health workers or traditional birth attendants to provide health services that are of acceptable quality.

To achieve future reductions in the high rates of malnutrition that exist in developing countries, it is necessary to focus on the big picture of how malnutrition can be reduced most effectively and to look beyond the immediate contributing factors. This would involve reducing women's time constraints so they can attend education and training sessions; increasing women's income so they can purchase these dietary supplements; or improving women's access to land, fertilizers, and other production technologies so they can increase production of food crops to feed their children.

Thus, it is critical that a new generation of approaches explicitly address women's resource constraints if families are to be provided with sustainable ways to promote the nutritional status of their own members. This recommendation is not revolutionary in content. What is new is demonstrating different and additional avenues for accomplishing it. Success will require drawing from different disciplines, including community development, economics, agriculture, microfinance, as well as child survival, health, and nutrition. To make the process work partnerships will have to be formed among institutions. It would be a mistake for institutions to stretch their skills across disciplines and across expertise areas of programs and research. This paper proposes some very specific recommendations that need to be considered by researchers, by program planners, and by policymakers if the process is going to work:

■ **Researchers should investigate and rigorously evaluate a variety of ways to increase women's access to resources that will better enable them to promote nutrition in their families.**

The strong research and evaluation skills of nutrition researchers are needed to investigate the interventions that most positively impact nutritional status, and to determine in which combinations, under which circumstances, and in what doses the interventions work best. Rigorous evaluation includes collecting reliable data to inform the design of the intervention, and conducting assessments before, during and after the intervention, with an intervention period of sufficient duration to enable measurement of impact. During the assessment, researchers should pay careful attention to process indicators to determine if the intervention is going well and to the use of appropriate impact indicators, such

as weight, height, hemoglobin or serum vitamin A, depending on the goal of the study. Researchers should work with program practitioners and community members to interpret the data and draw conclusions and recommendations for programs and policies.

Once the intervention research has been conducted, the researchers should join with the program practitioners to disseminate the results widely, especially to policymakers in the national and international arenas so they can be persuaded to support efforts using a women's resources approach.

■ **Program planners should use a women's resources approach, and join with researchers to evaluate and document its impact on improving nutritional status.**

Some interventions, typically those implemented by NGOs, already "go outside the box" by using a variety of approaches to improve nutrition. These institutions are apt to be flexible and responsive to community needs in their programming because they work closely with communities and use a broad development approach integrating numerous perspectives and expertise (Shah et al. 1999). Thus, they often realize and act upon the need to address fundamental constraints, including women's access to resources.

Program practitioners should continue to draw on their strong community development and intervention skills to focus attention on many aspects of the big picture of community nutrition and to identify constraints that contribute to malnutrition.

Their close connections to communities and their innovative spirit can lead to a new generation of approaches to make future improvements in nutritional status in developing countries.

Program practitioners should join with nutrition researchers and with communities in designing and implementing effective approaches to addressing women's resource constraints, as well as in monitoring and evaluating the process, outcome, and impact results. This partnership will enable program practitioners to document, analyze, and evaluate their results, so that, together with the researchers, they can make a strong argument to policymakers and other program practitioners and researchers.

■ **In order to promote the women's resources approach, policymakers should insist on partnerships between program practitioners and researchers from a variety of disciplines.**

National and international policymakers can promote this new approach by ensuring that supportive policies are in place, such as easing the way for women to have access to credit or land tenure, or by encouraging input from communities, NGOs, and others in resource allocation decisions. In addition, donors and policymakers can encourage this resource-focused, partner-supported approach by allocating their resources contingent on assessments of women's resource needs; by demanding reliable data; and by assuring that program planners and researchers are active members of the design, implementation, and evaluation effort; and by encouraging communities to participate.

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This publication was made possible through support provided by the OMNI Research Project managed by the International Life Sciences Institute with funds from the Office of Health and Nutrition, the United States Agency for International Development (USAID) under the terms of Cooperative Agreement No. HRN-5122-A-00-3046-00. The opinions expressed herein do not necessarily reflect the views of USAID.

